

Title: ALL-UNION SCIENTIFIC RESEARCH INSTITUTE OF REFRACTORY AND  
ACID RESISTANT MATERIALS (USSR)

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**CONFIDENTIAL****ALL-UNION SCIENTIFIC RESEARCH INSTITUTE OF REFRACTORY AND  
ACID RESISTANT MATERIALS (VIOK)**

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**Location:**

Leningrad, No 2 Tushkova Naberezhnaya;  
Telephone 1-09-95, 1-36-33, and 2-57-61.

VIOK is subordinate to the Main Administration of the Metallurgical Industries under the People's Commissariat for the Heavy Industries (GUMP METP).

**Director:**

A. Ya. Levin

**Deputy Director for Scientific Matters:**

Prof. B. S. Shvetsov.

VIOK conducts research work in the field of raw materials for refractory and acid resistant material industries, and attends to matters connected with the manufacture and utilization of refractory and acid resistant materials as well as matters connected with the control of the quality of these materials.

**Scientific Sectors and Laboratories:****Sectors:**

Refractory Materials

Acid Resistant Materials

Thermo-Mechanical Testing

Technico-Economical Research

Control of the Quality of Production:

1. Group of the Main Inspectorate on Matters of Quality
2. Special Group on Plant Laboratories

Scientific Methodological

**Laboratories:**

Mineralogical and Petrographic

Analytical

X-ray (X-ray Laboratory)

Physical and Colloidal Chemistry

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### Laboratories (Cont'd):

Physical Research

### Workshops:

Technical

Electrotechnical

Ceramics

### Leading Scientific Personnel and Specialists:

Academician A. . Baykov - Chief of the Sector on Refractory Materials

Prof D. S. Bolyankin - mineralogy, petrography, and roentgenography

Prof A. D. Gel'dman - Physics and Chief of the Laboratory of Physical Research

Prof A. A. Vosyatchenskiy - mineralogy as well as physical and colloidal chemistry

Prof L. S. Zhvetsov - technology of silicates

Docent I. A. Gold - Chief of the Laboratory of Physical and Colloidal Chemistry

Docent L. M. Muravlev - technology of silicates and Chief of the Sector of Acid Resistant Materials

Docent D. N. Golubovarinov - technology of silicates. Chief of the Chamotte Group.

Engineer I. F. Baryshev - technology of refractory materials. Chief of the Experimental Equipment in VIOK as well as Chief of the Ceramics Workshop

Engineer A. S. Bazilevich - technology of silicates and Chief of the Group on Highly Refractory Materials

Engineer P. P. Vyazel'shchikov - technology of refractories. Deputy Chief of the Chamotte Group

V. V. Goncharov - mineralogy, petrography, and roentgenography. Chief of the Mineralogical and Petrographic Laboratory of the X-ray Laboratory.

M. A. Dnestrovskiy - technology of refractories; control of the quality of refractories; thermo-mechanical testing. Chief of the Thermo-Mechanical Sector.

V. N. Dykas - Chief of the Analytical Laboratory

M. V. Yevseyev - Chief of the Dinas Study Group

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**CONFIDENTIAL**Leading Scientific Personnel and Specialists (Cont'd)

Engineer K. A. Karayannoula - technology of silicates. Chief of the Dinas Study Group.

I. I. Laputin - technology of acid resistant materials. Deputy Director of the Sector on Acid Resistant Materials

Engineer-Geologist A. D. Fedoseyev - technology of silicates; mineralogy and petrography

Engineer-mechanic N. P. Shchelkunov - plant equipment. Chief of the Group for the Maintenance of Equipment

Semi-Industrial and Experimental Installations:

The Experimental installations at the Institute consist of a machine shop, a ceramics workshop, and a mechanical workshop. The equipment includes grinding and milling machines, mixers, molding equipment, furnaces capable of creating temperatures of 1700 degrees as well as technological equipment.

The experimental installation prepares samples of refractory and acid-resistant materials in accordance with assignments made by the technological sector of the Institute. It also constructs electrical furnaces designed by VIOK and intended for industrial use; nozzles designed for use in underground gasification installations; and mechanical saws designed by VIOK for use in the ceramics industry.

The Thermo-mechanical Sector is the central experimental laboratory for the mechanical and thermal testing of raw materials for refractories as well as the finished product. A great number of varied electrical furnaces permits the carrying out of experiments at temperatures in excess of 3,000 degrees Centigrade. A special workshop is provided for the manufacture of model parts and specimens of refractory materials. This sector also has special standardized apparatus which is utilized to check the accuracy of other equipment in VIOK as well as other industrial installations.

Total number of personnel

272

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Engineering and Scientific personnel

108

1935 annual budget

1,700,000 rubles

Some of the Basic Problems Currently Undertaken at the Institute:

Studies of various raw material bases for the refractory industry of Moscow oblast, for the Magnitogorsk metallurgical combine, the Kuznets Metallurgical Plants, the Khalilov Metallurgical plants, etc.

Selection of raw materials and their classification and the solution of various technological problems connected with the construction of stoppers and linings for large ladles (150 ton parts for the Magnitogorsk combine, for the Kuzbass, etc.)

Work of the same type in connection with the building of blast furnaces: Improvement of the technological processes for the development and manufacture of refractory materials which do not have to be fired: Development work in connection with the production of ladle and siphon refractories at the Borovichi plant: Elaboration of steps necessary for the manufacture of standard brick in accordance with the uses to which the brick will be put ( for locomotives, furnaces, etc.): Development of acid resistant products on the basis of Borovichi crude material; Selection of refractory materials for Noulens furnaces.

Utilization of Ural raw materials for the manufacture of refractory materials to substitute for "Klebsand".

Selection of material for lining apparatus used in the cracking of methane, etc.

Methods for determining the elasticity of refractory materials under conditions of high temperatures.

Methods of investigating the size and shape of pores as well as the nature of strains arising in acid resistant products.

Development and introduction into practice of guniting processes.

Development of the production of resistance rods of all sizes from domestic crude materials.

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Industrial Installations which Regularly Utilize the Services of VIOK

Combine "Krasnyy Keramik", in Borovichi, and Plants No 1, No 12,  
No 2, No 3, N° 4, and No 5.

Chamotte Plant No 9 at Semiluki

Chamotte Plant No 8 at Latnaya Station

Chamotte Plants at Podolsk and Shchekina

Chamotte Plant at Stalingorok

Acid Resistant Materials Plant at Shchekin

Sukholozh Chamotte Plant

Pervoural Dinas Plant

Refractory Plants of the Mosogneupory Trust: Lobnensk, Snigirevskiy,  
Katunarov and Kudinov.

Various refractory shops of metallurgical plants

Electric power stations of Mosenergo and the All-Union Thermal-  
Engineering Institute

Enterprises of the ministry of heavy machine building

Enterprises of SoyuzKhimMontazh

Enterprises of SoyuzAzot

Construction Branch of TeploStroy

The following type of assistance is rendered to industrial  
installations by VIOK:

Regulations governing the selection of refractory and acid resistant  
raw materials. Rating of raw materials.

Elementary methods for testing raw materials on the spot.

Methods for ceramic testing of refractory and acid resistant  
materials in laboratories and in plants.

Organization and equipping of laboratories.

Various requirements for raw materials in accordance with their  
technological uses.

Selection and installation of crushing, milling, mixing, and molding  
equipment.

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Organization of methods for the control of production.  
 Utilization of refractory materials.  
 Methods of chemical, mechanical, thermal, and petrographic  
 testing and analysis of manufactured items.

The demands of an expanding metallurgical industry in the USSR prompted the foundation of VIOK in 1932. The first task was to work out high quality blast furnace reserves at plants No 1 and No 2 in Dorovichi.

One of the most complicated and most expensive procedures in the manufacture of chamotte brick is the firing operation. The institute was able to develop the technique for the manufacture of a satisfactory chamotte brick without actual firing. By-products of the paper (cellulose) industry were utilized as bonding agents (sulfite-cellulose liquor). However, it appears that these bricks did not retain a constant volume on firing, and, moreover, they were not impervious to the effects of humidity. At the present time experiments are being conducted to determine methods for increasing the humidity resistance of these bricks.

In the USA there is extensive application of dry pressing of chamotte parts. However, when this method was introduced in the USSR, several difficulties became evident. VIOK conducted numerous experiments with various raw materials to determine the best type of materials to be used in the dry pressing operations in the USSR. The institute met noteworthy success and today, several large Soviet plants are producing chamotte parts by the dry pressing method.

The Institute also developed a method for the preparation of charges for the production of glass in a vacuum ribbon press which permitted full mechanization of the process of feeding the glass charge. An imported vacuum press was installed at the Semiluki Refractory Plant No 9, but it was found lacking in certain respects, particularly in

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view of the fact that special charges had to be made to achieve maximum performance. Not much research had been done on this subject in the USSR, but finally, after a trial and error method, a group of workers at the plant was able to compound a satisfactory charge.

Silic resistance rods were always imported. The institute, however, produced resistance rods having a useful life of 1,000 hours at 1300 degrees and measuring 320 millimeters (this is the size for which there is the greatest demand).

Much other work goes on at the Institute. In this connection may be mentioned a special acid resistant cement produced from domestic raw materials, studies on clays found in Moscow oblast, studies to determine the best way in which Moscow Industries can use locally available raw materials, etc.

Among the completed works of the Institute it might be of interest to mention studies of the separation of silicates in layers on heating.

By means of the Sector on the Control of the Quality of Production the institute maintains control over the quality of the production of various plants and coordinates work in the field of refractory and acid-resistant materials. Within this Sector, the Group of the Main Inspectorate on Matters of Quality undertakes the actual check of the quality of products and raw materials, while the Special Group on Plant Laboratories maintains control over laboratory operations and carries out inspection of plant laboratories.

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